HVAC DESIGN DATA

OUTDOOR DESIGN TEMPERATURES — 95 DEG. F Db SUMMER; 78 DEG. F Wb SUMMER; 0 DEG. F Db WINTER — DESIGN ALTITUDE: 638 FT.

INDOOR AREA DESIGN CONDITIONS	SUMMER Db (°F)	SUMMER % HUMIDITY	WINTER Db (°F)	WINTER % HUMIDITY
ALL AREAS	75	50	72	-
UNOCCUPIED MODE (1)	80	-	60	-

NOTES:
1 REFERS TO OCCUPANCY STATES FOR CONTROL OF AIR TERMINAL UNITS. REFER TO AIR TERMINAL UNIT SCHEDULE AND CONTROL SEQUENCES.

DUCT PRESSURE CLASS & LEAKAGE TABLE

SYSTEM	DUCT INVOLVED	POSITIVE (P) OR NEGATIVE (N) PRESSURE	SMACNA CONST. CLASS W.G.	SMACNA SEAL CLASS	SMACNA LEAKAGE CLASS RECTANGULAR DUCT	SMACNA LEAKAGE CLASS ROUND DUCT
ALL SYSTEMS	ALL DUCTWORK EXCEPT AS LISTED BELOW.	P/N	± 2"	A	6	3
	3-AHU1 SUPPLY AIR DUCTS FROM OUTLET OF AH-UNIT TO AIR TERMINAL UNITS.	P	2"	A	6	3
	3-AHU1 SUPPLY AIR DUCTS FROM OUTLET OF AIR TERMINAL UNITS TO SUPPLY AIR DEVICES	P	1"	A	6	3
	3-AHU2 SUPPLY AND RETURN DUCTS	P/N	± 1"	A	6	3
	3-AHU1 RETURN, EXHAUST AND OUTSIDE AIR DUCTS	N	-2"	A	6	3

AIR FILTER SCHEDULE

FILTER NO.	CFM	SYSTEM	MERV RATING	MAX. S.P. DROP (1) INITIAL	MAX. S.P. DROP (1) FINAL	HOUSING TYPE	MAX. FACE VELOCITY	SEE NOTE
3-PF1	5,400	3-AHU1	11	0.27"	2.0"	SIDE ACCESS HOUSING	500	1,2
3-PF2	1,600	3-AHU2	8	0.33"	1.0"	SIDE ACCESS HOUSING	500	1,2

NOTES:
1 STATIC PRESSURE REQUIREMENTS BASED ON 500 FPM FACE VELOCITY. FINAL PRESSURE DROPS BASED ON VA'S RECOMMENDED CHANGE OVER PRESSURE DROP.
2 FILTER HOUSING TO BE PART OF AIR HANDLING UNIT ASSEMBLY.

AIR FLOW MEASURING DEVICE SCHEDULE

UNIT NO.	LOCATION	DUCT SIZE WxH	FAN SIZE & TYPE	CFM MIN.	CFM MAX.	S.P. DROP	SYSTEM
3-AFM1	3-AHU1 SUPPLY DUCT	46"x12"	NA	2,280	5,400	0.1"	3-AHU1
3-AFM2	3-AHU1 RETURN DUCT	34"x34"	NA	1,470	4,530	0.1"	3-AHU1

CURB MOUNTED GRAVITY HOOD SCHEDULE

HOOD NO.	THROAT SIZE IN.	SERVICE/ UNIT	CFM	MAX. S.P. IN.	DAMPER TYPE	DAMPER OPERATOR	MIN. FREE AREA (SQ. FT.)
3-GRV1	24x54	RELIEF AIR FOR 3-AHU1	4,530	.03	AUTO	ELECTRIC	9.0

AIR HANDLING UNIT SCHEDULE

UNIT NO.	LOCATION	AREA SERVED	SUPPLY FAN NO.	CFM SUPPLY	CFM O.A.	EXTERNAL S.P. (1) IN.	SPECIFIED INTERNAL LOSSES (2) IN.	UNSPECIFIED INTERNAL LOSSES (3) IN.	FAN TOTAL S.P. (4) IN.	TYPE OF SYSTEM (5)
3-AHU1	SOUTHWEST WING MECH RM 101E	SOUTHWEST WING	3-SF1	5,400	810	1.5	1.5	0.2	3.2	VAV, DX AIR HANDLING UNIT WITH STEAM HEATING COIL AND REMOTE CONDENSING UNIT
3-AHU2	NORTHWEST WING MECH RM 106M	GROUP ROOM 106K	NA	1,600	240	-	-	-	0.5	VAV, VERTICAL DX HEAT PUMP FAN COIL UNIT WITH REMOTE CONDENSING UNIT

NOTES:
1 EXTERNAL STATIC PRESSURE REQUIRED AT DUCT CONNECTIONS TO INLET AND OUTLET OF AHU. MEASUREMENTS SHALL BE TAKEN WITHIN 3 FT. OF INLET AND OUTLET AT A POINT OF MAXIMUM ACCURACY.
2 TOTAL OF MAXIUMUM PRESSURE DROPS OF COMPONENTS WHICH ARE SPECIFIED SEPARATELY, I.E. PREFILTERS, AFTER FILTERS, HEATING AND COOLING COILS, DIFFUSER PLATE AND SOUND ATTENUATOR. AIR FILTER PRESSURE DROP SHALL BE SELECTED AT MID-LIFE.
3 INTERNAL LOSS ALLOWANCE SHALL INCLUDE LOSSES DUE TO ENTRANCE AND EXIT OF AHU, MIXING BOXES, DIFFUSER SECTION (OTHER THAN DIFFUSER PLATE) INCLUDING LOSSES DUE TO FAILURE TO PROPERLY CONVERT FAN DISCHARGE VELOCITY PRESSURE TO STATIC PRESSURE, FAN INLET CONDITIONS, CASINGS, HUMIDIFERS, DAMPERS, ETC.
4 TOTAL FAN S.P = EXTERNAL STATIC PRESSURE + SPECIFIED INTERNAL LOSSES + UNSPECIFIED INTERNAL LOSSES. MANUFACTURER SHALL PROVIDE SUBMITTAL SHOWING ACTUAL LOSSES OF ALL EQUIPMENT PROVIDED. REFER TO FAN SCHEDULE FOR ADDITIONAL FAN SELECTION INFORMATION.
5 REFER TO AIR HANDLING UNIT DETAIL ON SHEET H5 AND SECTIONS ON FLOOR PLANS FOR AH-UNIT LAYOUT AND COMPONENTS.

DX HEAT PUMP FAN COIL UNIT SCHEDULE

UNIT NO.	TYPE	FAN CFM	O.A. CFM	NOM. COOLING CAPACITY BTU/HR	ELECTRIC VOLT.-PHASE	ELECTRIC FLA	ELECTRIC MCA	ELECTRIC MOCP	APPROX SIZE D	APPROX SIZE W	APPROX SIZE H	NOTES
3-AHU2	FLOOR SET VERT. CABINET	1,600	240	48,000	115-1	4.3	4.3	4.3	22"	21"	54"	

FAN SCHEDULE

FAN NO. (4)	LOCATION	FAN CFM	FAN S.P.	FAN TYPE	DESCRIPTION	WHEEL TYPE	WHEEL MIN. DIA.	MAX. RPM	DRIVE	MAX. SONES (dBA)	MOTOR MAX. BHP	MOTOR NOM. HP (2)	MOTOR PHASE VOLT.	MOTOR VSMC	SEE NOTE
3-SF1	3-AHU1	5,400	3.2"	CF	3-AHU1 SUPPLY FAN	FC	18"	1,150	BELT	-	6.8	7.5	3-208	YES	1,3
3-RF1	SEE FLOOR PLANS	4,590	0.88"	CF	3-AHU1 INLINE CENTRIFUGAL RETURN FAN	FC	24.5"	800	BELT	13.9	1.35	1.5	3-208	YES	1,3
3-EF1	SEE FLOOR PLANS	595	0.5"	RV	DOWNBLAST ROOF VENTILATOR	BIW	10"	1,500	BELT	8.3	0.22	0.25	1-115	NO	

NOTES :
1 SCHEDULED MAXIMUM BHP IS FOR SCHEDULED SP PLUS TEN PERCENT. IF UNIT COIL PRESSURE DROPS SUBMITTED ARE LESS THAN SCHEDULED, THEN THE SP REQUIREMENT MAY BE REDUCED ACCORDINGLY. MAXIMUM BHP MAY BE BASED ON THE REVISED SP PLUS TEN PERCENT.
2 MOTORS SHALL BE ENERGY EFFICIENT TYPE.
3 REFER TO ELECTRICAL DRAWINGS FOR VARIABLE SPEED MOTOR CONTROLLER ASSOCIATED WITH THIS FAN.
4 CONTACT PLANT ENGINEERING FOR ACTUAL FAN NUMBER.

STEAM PREHEAT COIL SCHEDULE

COIL NO.	TYPE	SYSTEM	CFM	MAX. FACE VEL. FPM	MAX. S.P. LOSS IN	TEMP. AIR °F ENT.	TEMP. AIR °F LVG.	MIN. BTUH	STEAM PSIG ENT. CONTROL VALVE	STEAM PSIG ENT. COIL	CONTROL VALVE LBS/HR	TRAP LBS/HR
3-PH1	STEAM DIST.	3-AHU1	5,400	500	0.07	48	79	181,820	5	2	189	378

DX COOLING COIL SCHEDULE

COIL NO.	SYSTEM	CFM	MAX. FACE VEL. FPM	MAX. S.P. IN	ENT. AIR °F Db	ENT. AIR °F Wb	LVG. AIR °F Db	LVG. AIR °F Wb	MINIMUM MBH TOTAL	MINIMUM MBH SENS.
3-CC1	3-AHU1	5,400	450	0.5	78	65.5	55	53.8	190	136

AIR COOLED CONDENSING UNIT SCHEDULE

UNIT NO.	REFRIGERANT	NOMINAL CAPACITY BTUH	O.A. TEMP. °F SUMMER	O.A. TEMP. °F WINTER	MCA	MOCP	MIN. EER	COMPRESSOR MOTOR QUANTITY	COMPRESSOR MOTOR VOLT-PHASE	CONDEN. FAN MOTOR QUANTITY	CONDEN. FAN MOTOR VOLT-PHASE
3-CU1	R-410A	20 TONS	95	-3.3	86	100	10	2 (2)	208-3	2	208-1
3-CU2	R-410A	4 TONS	95	-3.3	35	15	11	1 (1)	208-1	1	115-1

NOTES:
1 2 STAGE
2 UNIT SHALL INCLUDE HOT GAS BYPASS.

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Revisions		Date
1	ADDENDUM 2	3/14/13

CONSULTANTS:
Heapy Engineering
Mechanical Electrical Commissioning Technology
Nationally Recognized Leader in Sustainability / LEED
1400 W Dorothy Lane, Dayton OH 45409-1310
Ph: 937-224-0861 Fax: 937-224-5777 www.heapy.com
Heapy Project No. 2011-04033 Firm License No. 01528

STATE OF OHIO — JOHN A. BLACK 49341 — REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:
JOHN POE ARCHITECTS
116 EAST THIRD STREET
DAYTON, OHIO 45402-2130
937 461 3290 PHONE
937 461 0260 FAX
jpa@johnpoe.com

Drawing Title: SCHEDULES
Approved: Project Director

Project Title: Renovate Occupational Therapy Building 3
Location: Chillicothe, Ohio
Date: 02/04/2013 | Checked: DLE | Drawn: WJS

Project No. VA Project No. 538-13-101 JPA Project No. 11013.00
Building Number: 3
Drawing Number: H2
Dwg. of xx

Office of Construction and Facilities Management
Department of Veterans Affairs

STEAM CONVECTOR SHEDULE

UNIT NO. (3)	LOCATION	TYPE UNIT	MOUNTING	HTG. MBH	ENT. AIR	STEAM PSIG	ELEMENT LENGTH	STEAM LBS/HR	TRAP LBS/HR	RUNOUT SIZE	APPROX. CABINET DIMS. LENGTH	HEIGHT	DEPTH	NOTES
3-CONV1	SEE PLANS	CABINET FINNED TUBE CONVECTOR	WALL HUNG	3.5	65	2	3'-6"	3.6	7.2	0.75"	(4)	24"	5.375"	1,2
3-CONV2	SEE PLANS	CABINET FINNED TUBE CONVECTOR	WALL HUNG	4.0	65	2	4'-0"	4.1	8.2	0.75"	(4)	24"	5.375"	1,2
3-CONV3	SEE PLANS	CABINET FINNED TUBE CONVECTOR	WALL HUNG	4.5	65	2	4'-6"	4.7	9.4	0.75"	(4)	24"	5.375"	1,2
3-CONV4	SEE PLANS	CABINET FINNED TUBE CONVECTOR	WALL HUNG	5.0	65	2	5'-0"	5.2	10.4	0.75"	(4)	24"	5.375"	1,2
3-CONV5	SEE PLANS	CABINET FINNED TUBE CONVECTOR	WALL HUNG	5.6	65	2	5'-6"	5.8	11.6	0.75"	(4)	24"	5.375"	1,2
3-CONV6	SEE PLANS	CABINET FINNED TUBE CONVECTOR	WALL HUNG	6.6	65	2	6'-6"	6.8	13.6	0.75"	(4)	24"	5.375"	1,2
3-CONV7	SEE PLANS	CABINET FINNED TUBE CONVECTOR	WALL HUNG	11.0	65	2	8'-0"	11.4	22.8	0.75"	(4)	24"	5.375"	1,2
3-CONV8	SEE PLANS	CABINET FINNED TUBE CONVECTOR	WALL HUNG	35.4	65	2	16'-0"	36.7	73.4	0.75"	(4)	24"	5.375"	1,2

NOTES:

1 VERIFY/COORDINATE CABINET DIMENSIONS AND MOUNTING REQUIREMENTS PRIOR TO ORDERING.

2 BOTTOM INLET, SLOPING TOP WITH STAMPED OUTLET GRILLE AND KNOB DAMPER.

3 SEE PLANS FOR QUANTITY.

4 PROVIDE WALL TRIM, TRIM STRIPS, ETC FOR FINISHED APPREARANCE. EXTEND ENCLOSURE FROM WALL TO WALL. REFER TO FLOOR PLAN FOR LENGTHS.

STEAM UNIT HEATER SCHEDULE

UNIT NO.	LOCATION	TYPE UNIT	CFM	MIN. MBH	ENT AIR	STEAM PSIG CONTROL VALVE	STEAM PSIG UNIT	TRAP LBS/HR (NOTE 2)	RUNOUT SIZE S/R	APPROX. CABINET DIMS. LENGTH	WIDTH	HEIGHT	MOTOR HP	VOLT.-PHASE	NOTES
3-UH1	SHARED WAITING	HORIZONTAL CONCEALED	565	36.8	60	5	2	38	1"	26"	35"	10"	0.22	115-1	1

NOTES:

1 VERIFY/COORDINATE CABINET DIMENSIONS, MOUNTING & RECESS REQUIREMENTS PRIOR TO ORDERING.

2 TRAP MAXIMUM DIFFERENTIAL PRESSURE RATING SHALL EXCEED STEAM PRESSURE UPSTREAM OF STEAM UNIT HEATER CONTROL VALVE.

AIR DISTRIBUTION DEVICES

SYMBOL	DESCRIPTION	TYPE MOUNTING LAY-IN	TYPE MOUNTING SURFACE	MATERIAL STEEL	MATERIAL ALUM	FINISH E.C.L.	FINISH W.B.E.	ACCESSORIES	SEE NOTE
CD1	STANDARD SQ. PLAQUE CEILING DIFFUSER ROUND NECK	∘		∘			∘		
CG1	EGGCRATE CEILING GRILLE	∘			∘		∘		
CG2	EGGCRATE CEILING FILTER GRILLE	∘			∘		∘		
CR1	EGGCRATE CEILING REGISTER	∘			∘		∘	OPPOSED BLADE DAMPER	
CR2	EGGCRATE CEILING REGISTER		∘		∘		∘	OPPOSED BLADE DAMPER	
TR1	ADJUST. BLADE SUPPLY REGISTER		∘	∘			∘	OPPOSED BLADE DAMPER	
TR2	FIXED BLADE RETURN/ EXHAUST REGISTER		∘	∘			∘	OPPOSED BLADE DAMPER	

AIR TERMINAL UNIT SCHEDULE

UNIT NO. (1)	CFM MAX.	CFM WINTER MIN.	CFM SUMMER MIN.	CFM UNOCCUPIED (5)	APPROX. INLET SIZE (IN.)	DUCT RUNOUT SIZE TO UNIT (IN.)	UNIT MAX. SP AT MAX. CFM (2)	SOUND REQUIREMENTS SP ACROSS UNIT AT MAXIMUM ROOM NC	SOUND REQUIREMENTS MAX. ROOM NC (3)	CONTROL TYPE (4)
1-1	600	300	115	115	8	10	0.35"	3.0"	35	V.V.R.
1-2	385	195	70	70	7	9	0.35"	3.0"	35	V.V.R.
1-3	800	405	360	360	9	11	0.35"	3.0"	35	V.V.R.
1-4	1010	505	355	355	12	14	0.35"	3.0"	35	V.V.R.
1-5	535	270	270	270	7	9	0.35"	3.0"	35	V.V.R.
1-6	770	390	390	390	9	11	0.35"	3.0"	35	V.V.R.
1-7	1295	650	650	650	14	16	0.35"	3.0"	35	V.V.R.

NOTES :

1 SEE STEAM REHEAT COIL SCHEDULE FOR ASSOCIATED REHEAT COIL.

2 THE UNIT MAXIMUM SP IS THE PRESSURE DIFFERENCE BETWEEN THE UNIT INLET AND DISCHARGE INCLUDING REHEAT COIL AND SOUND ATTENUATOR. IT IS ALSO THE MINIMUM PRESSURE REQUIRED AT THE UNIT INLET TO OBTAIN THE RATED CFM.

3 UNIT NOISE LEVEL SELECTION SHALL NOT EXCEED LISTED MAX. ROOM NC FROM BOTH AIRBORN AND RADIATED NOISE. BASED ON A 10 DB ROOM ABSORPTION COFFICIENT (REFERENCE 10 [-12] WATTS) WITH 2" S.P. DIFFERENTIAL ACROSS UNIT AT MAXIMUM CFM SETTING. A SOUND ATTENUATOR SHALL BE PROVIDED WITH TERMINAL UNIT IF NECESSARY TO MEET NC REQUIREMENT.

4 CONTROL TYPES: V.V.R.: VARIABLE VOLUME REHEAT TERMINAL; C.V.R.: CONSTANT VOLUME REHEAT TERMINAL.

5 AIR TERMINAL UNIT CONNECTED TO AN OCCUPANCY SENSOR PROVIDED BY DIVISION 26, FOR UNOCCUPIED CONTROL MODE, REFER TO CONTROL SEQUENCES ON SHEET H6, AND UNOCCUPIED HEATING & COOLING SETPOINTS IN "HVAC DESIGN DATA" SCHEDULE ON SHEET H2.

STEAM REHEAT COIL SCHEDULE

COIL NO.	TYPE	AIR TERMINAL UNIT	CFM	MAX. FACE VEL. FPM (1)	MAX. S.P. LOSS IN (2)	TEMP. AIR °F ENT.	TEMP. AIR °F LVG.	MIN. BTUH	STEAM PSIG ENT. CONTROL VALVE	STEAM PSIG ENT. COIL	CONTROL VALVE LBS/HR	TRAP LBS/HR
1-1	STEAM DIST	1-1	300	600	0.1	55	95	13,170	5	2	13.6	27.2
1-2	STEAM DIST	1-2	195	600	0.1	55	103	10,140	5	2	10.5	21.0
1-3	STEAM DIST	1-3	405	600	0.1	55	96	17,800	5	2	18.4	36.8
1-4	STEAM DIST	1-4	505	600	0.1	55	95	21,950	5	2	22.7	45.4
1-5	STEAM DIST	1-5	270	600	0.1	55	98	12,490	5	2	12.9	25.8
1-6	STEAM DIST	1-6	390	600	0.1	55	95	16,720	5	2	17.3	34.6
1-7	STEAM DIST	1-7	650	600	0.1	55	96	28,880	5	2	29.9	59.8

NOTES :

1 MAX VELOCITY BASED ON MAX CFM. REFER TO AIR TERMINAL UNIT SCHEDULE.

2 0.35" MAXIMUM S.P. LOSS FOR AIR TERMINAL UNIT, DUCT TRANSITION AND REHEAT COIL.

FULLY SPRINKLERED

Revisions		Date
1	ADDENDUM 2	3/14/13

CONSULTANTS:

Heapy Engineering
Mechanical Electrical Commissioning Technology
Nationally Recognized Leader in Sustainability / LEED
1400 W Dorothy Lane, Dayton OH 45409-1310
Ph: 937-224-0861 Fax: 937-224-5777 www.heapy.com
Heapy Project No. 2011-04033 Firm License No. 01528

STATE OF OHIO JOHN A. BLACK 49341 REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

JOHN POE ARCHITECTS
116 EAST THIRD STREET
DAYTON, OHIO 45402-2130
937 461 3290 PHONE
937 461 0260 FAX
jpa@johnpoe.com

Drawing Title: SCHEDULES

Approved: Project Director

Project Title: Renovate Occupational Therapy Building 3

Location: Chillicothe, Ohio

Date: 02/04/2013 | Checked: DLE | Drawn: WJS

Project No. VA Project No. 538-13-101 JPA Project No. 11013.00

Building Number: 3

Drawing Number: H3

Dwg. of xx

Office of Construction and Facilities Management

Department of Veterans Affairs

SEQUENCE OF OPERATION FOR 3-AHU2

1. GENERAL

1.1 MICROPROCESSOR CONTROLLED, EMS COMMUNICATING, FAN COIL. FAN COIL SHALL BE CAPABLE OF COMMUNICATING WITH AND SENDING ALARMS TO, THE BUILDING AUTOMATION NETWORK, UTILIZING A FACTORY INSTALLED MICROPROCESSOR. FAN COIL NOT REQUIRED TO BE INTEGRATED INTO CAMPUS DDC SYSTEM NETWORK UNDER THIS PROJECT.

1.2 EACH FAN COIL SHALL INCLUDE A FACTORY MOUNTED AND WIRED FAN COIL CONTROLLER (FC). THE CONTROLLER SHALL BE A SOLID STATE MICROPROCESSOR BASED TYPE USED TO CONTROL EACH FUNCTION OF THE APPLICABLE HVAC EQUIPMENT USING DIRECT DIGITAL CONTROL (DDC) AND SPECIFICALLY DESIGNED SOFTWARE. THE FC SHALL BE CAPABLE OF PROVIDING STAND-ALONE OPERATION. ALL APPLICATION SOFTWARE ACTUALLY PERFORMING THE REQUIRED CONTROL FUNCTIONS SHALL BE SUPPLIED WITH THE FC, PRE-TESTED AND PRE-CONFIGURED. ALL CLOSED LOOP DDC ROUTINES SHALL UTILIZE FC BASED SOFTWARE ALGORITHMS THAT SHALL BE RESIDENT IN THE FC MEMORY. THE FC SHALL BE FULLY FACTORY TESTED, AND MOUNTED IN THE UNIT. THE CONTROL TRANSFORMERS SHALL BE FACTORY SUPPLIED, MOUNTED AND WIRED. THE FC SHALL NOT REQUIRE A BATTERY. ALL CONFIGURATION DATA IS TO BE STORED IN NON-VOLATILE MEMORY. SYSTEMS THAT REQUIRE A BATTERY TO STORE DATA ARE NOT ACCEPTABLE. UNIT SHALL BE CAPABLE OF COMMUNICATING WITH AND SENDING ALARMS TO, A BUILDING AUTOMATION NETWORK AND ALARM PRINTER. ⚠

1.3 THE FC SHALL INCLUDE AND MAINTAIN A 365-DAY CLOCK/CALENDAR WITH HOLIDAY FUNCTIONS. THE FC SHALL PROVIDE THE CAPABILITY TO PROVIDE TIME SCHEDULING FROM ANY OF:
- ITS OWN LOCAL TIME SCHEDULE
- A TIME SCHEDULE WITHIN ANOTHER CONTROLLER ON THE NETWORK
- A TIME SCHEDULE WITHIN A LINKAGE THERMOSTAT OR FROM A FIELD-SUPPLIED DRY CONTACT THAT PERFORMS REMOTE OCCUPANCY CONTROL.

TIMED OVERRIDE REQUESTS SHALL BE PERFORMED BY EACH FC WITHOUT ANY NETWORK REQUIREMENT. THE FC SHALL BE CAPABLE OF INTERFACING TO A PORTABLE PC FOR CONFIGURING, OR ALTERING THE CONFIGURATION, SETTING ADDRESS, UPLOADS, DOWNLOADS, ETC.

2 ALARM/ALERT PROCESSING

THE FC SHALL INCLUDE ROUTINE(S) TO PROCESS ALARMS AND ALERTS. ALARM/ALERT PROCESSING SHALL CONSIST OF A SCAN OF ALL INPUT POINTS. CERTAIN ANALOG ALARMS/ALERTS SHALL ONLY BE MONITORED WHEN THE FC IS IN THE OCCUPIED MODE (I.E., RELATIVE HUMIDITY, INDOOR AIR QUALITY SENSOR). TIME DELAYS SHALL BE PROVIDED WITH THE SOFTWARE TO PREVENT NUISANCE ALARMS/ALERTS DURING A TRANSITION PERIOD OR IF A SETPOINT CHANGE OCCURS. ALL ALARMS/ALERTS SHALL BE DISPLAYED AT A PORTABLE PC AND SYSTEM SHALL BA CAPABLE OF DISPLAYING THE ALARMS VIA THE NETWORK TO THE ECC.

3 STANDARD CONTROL HARDWARE

THE FC SHALL INCLUDE THE FOLLOWING CONTROL HARDWARE:

3.1 SUPPLY AIR SENSOR:
THE SENSOR SHALL BE A FACTORY SUPPLIED AND WIRED, THERMISTOR TYPE SENSOR (RTDS SHALL ALSO BE ACCEPTABLE). THE SENSOR SHALL BE INSTALLED TO PROPERLY MEASURE THE UNIT'S SUPPLY AIR TEMPERATURE. THE SENSOR SHALL BE WIRED TO THE FC.

3.2 SPACE TEMPERATURE SENSOR W/FAN SPEED & MODE SELECTOR: THE FACTORY SUPPLIED SENSOR SHALL BE A THERMISTOR TYPE (RTD'S SHALL ALSO BE ACCEPTABLE), WITH A PUSH BUTTON FOR REMOTE OVERRIDE. A REMOTE COMMUNICATION PORT, A SPACE TEMPERATURE SETPOINT ADJUSTMENT, AND A FIVE POSITION MODE/FAN SELECTOR SWITCH (AUTO, OFF, HI, MED, LO) FOR THE OCCUPANT. THE SENSOR SHALL BE HOUSED IN A PLASTIC ENCLOSURE WITH A MOUNTING PLATE. THE RANGE OF THE SETPOINT ADJUSTMENT SHALL BE CONFIGURABLE AT THE CONTROLLER, FROM 0 TO +/- 20.0°F. THE OVERRIDE DURATION SHALL ALSO BE CONFIGURABLE AT THE CONTROLLER, FROM 0 TO 4 HOURS AND MAY BE DISABLED IF NOT REQUIRED. THE SPACE TEMPERATURE SENSOR SHALL BE FIELD INSTALLED ON THE WALL WHERE SHOWN ON THE PLANS AND FIELD WIRED BACK TO THE FC.

FAN SPEED RELAYS:
THE RELAYS SHALL BE FACTORY SUPPLIED, INSTALLED AND WIRED TO THE FC AND TO THE MOTOR CIRCUIT. THE FC SHALL BE CAPABLE OF CONTROLLING A MINIMUM OF THREE FAN SPEEDS THROUGH THE RELAYS. THE CONTROL RELAYS FOR THE FAN MOTOR SPEEDS SHALL BE FACTORY SUPPLIED AND WIRED. ⚠

4 TEMPERATURE CONTROL :

4.1 IF THE FAN IS OPERATING AND THE SPACE TEMPERATURE RISES 2 DEG. ABOVE THE COOLING SETPOINT, THE FC SHALL ENABLE DX COOLING AND SHALL MAINTAIN THE COOLING SETPOINT. WHEN THE SPACE TEMPERATURE FALLS 2 DEG. BELOW THE HEATING SETPOINT, THE FC SHALL ENABLE DX HEATING AND MAINTAIN THE HEATING SETPOINT.

UNIT SHALL INCLUDE THE FOLLOWING MODES OF OPERATION IN ADDITION TO ABOVE:
-UNOCCUPIED MODE
-DEHUMIDIFICATION MODE
-DEFROST CYCLE

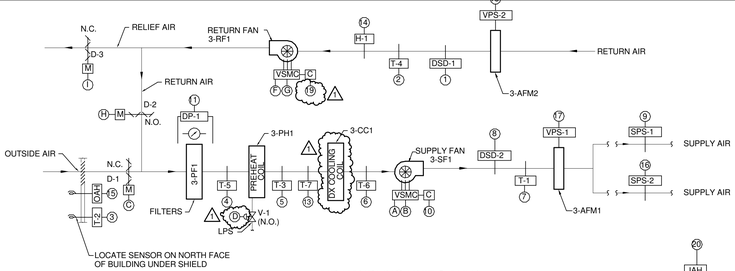
4.2 DAMPER CONTROL:
A TWO POSITION, OUTSIDE AIR DAMPER SHALL BE CONTROLLED THROUGH THE FC. THE DAMPER SHALL OPEN WHENEVER THE FAN IS OPERATING AND THE FC IS IN AN OCCUPIED MODE. THE DAMPER SHALL BE CLOSED AT ALL OTHER TIMES.

GENERAL NOTES

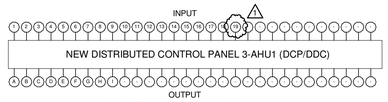
1 A COMPLETE SYSTEM OF AUTOMATIC TEMPERATURE CONTROLS SHALL BE INSTALLED UNDER THIS CONTRACT AS REQUIRED TO ACCOMPLISH THE SEQUENCE OF CONTROL FOR VARIOUS ITEMS OF EQUIPMENT AND SYSTEMS AS DESCRIBED HEREINAFTER. THE SYSTEM SHALL BE A DIRECT DIGITAL CONTROL SYSTEM UTILIZING ELECTRIC ACTUATION.

2 ELECTRICAL WORK INCLUDES A POWER SOURCE TO THE MOTOR STARTERS. ALL HVAC POWER SOURCES REQUIRED BEYOND THESE STARTERS OR BEYOND SOURCES EXPLICITLY SHOWN ON THE ELECTRICAL DRAWINGS, SHALL BE PROVIDED UNDER THE ATC WORK. THIS WORK SHALL INCLUDE BUT NOT BE LIMITED TO WIRING, CONDUIT, TRANSFORMERS, RELAYS AND FUSES.

3 POINTS LIST IS SHOWN AS AN AID TO THE CONTRACTOR INDICATING THE MINUMUM POINTS REQUIRED FOR CONTROL AND MONITORING. ALL INPUT AND OUTPUT POINTS, AND THEIR REQUIRED INTERFACE AND ACCESSORY HARDWARE, SHALL BE PROVIDED FOR A COMPLETE AND FUNCTIONAL CONTROL SYSTEM. IF OR WHEN ADDITIONAL POINTS ARE REQUIRED TO ACCOMPLISH THE SEQUENCES OF CONTROL SPECIFIED, THESE POINTS, ALONG WITH ADDITIONAL DIRECT DIGITAL CONTROL PANEL(S) (IF REQUIRED), SHALL ALSO BE PROVIDED.



AIR HANDLING UNIT 3-AHU1



CONTROL PANEL 3-AHU1

LEGEND (APPLIES TO CONTROL PANEL 3-AHU1)

C	CURRENT SENSING RELAY	TRANSMITS MOTOR CURRENT TO DCP TO INDICATE STATUS OF FANS.
DP-1	DIFFERENTIAL PRESSURE SENSOR	TRANSMITS DIFFERENTIAL PRESSURE TO DCP TO INDICATE FILTER CONDITION
DCP	DIRECT DIGITAL CONTROL PANEL	CONTROLS OPERATION OF AIR HANDLING UNIT IN ACCORDANCE WITH THE SEQUENCE OF OPERATION
D-1	MODULATING OUTSIDE AIR DAMPER	PROPORTIONS FLOW OF OUTSIDE AIR IN RESPONSE TO DCP AND CLOSES WHEN SUPPLY FAN STOPS
D-2	MODULATING RETURN AIR DAMPER	PROPORTIONS FLOW OF RETURN AIR IN RESPONSE TO DCP AND OPENS WHEN SUPPLY FAN STOPS
D-3	MODULATING RELIEF AIR DAMPER	PROPORTIONS FLOW OF RELIEF AIR IN RESPONSE TO DCP AND CLOSES WHEN SUPPLY FAN STOPS
DSD	DUCT SMOKE DETECTORS (FURNISHED AND WIRED TO FIRE ALARM PANEL BY ELECTRICAL)	PROVIDE SMOKE SIGNAL TO DCP
ECC	ENGINEERING CONTROL CENTER	LOCATED IN ENGINEERING BUILDING FOR MONITORING OF SYSTEM OPERATIONS
H-1	RETURN AIR HUMIDITY SENSOR	SENSES AND TRANSMITS RETURN AIR HUMIDITY TO DCP FOR CONTROL AND INDICATION
⚠ IAH	INDOOR AIR HUMIDITY SENSOR	SENSES AND TRANSMITS INDOOR AIR HUMIDITY TO DCP FOR CONTROL AND INDICATION
OAH	OUTSIDE AIR HUMIDITY SENSOR	SENSES AND TRANSMITS OUTSIDE AIR HUMIDITY TO DCP FOR CONTROL AND INDICATION
S	MOTOR STARTER	STARTS AND STOPS GENERAL EXHAUST FANS IN RESPONSE TO DCP
SPS-1 SPS-2	SUPPLY DUCT STATIC PRESSURE SENSOR	SENSES AND TRANSMITS DUCT STATIC PRESSURE TO DCP FOR CONTROL AND INDICATION
T-1	SUPPLY AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS SUPPLY AIR DRY BULB TEMPERATURE TO DCP FOR CONTROL AND INDICATION
T-2	OUTSIDE AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS OUTSIDE AIR DRY BULB TEMPERATURE TO DCP FOR CONTROL AND INDICATION
⚠ T-3	PREHEAT COIL LEAVING AIR TEMPERATURE	SENSES AND TRANSMITS PREHEAT COIL DISCHARGE AIR TEMPERATURE TO DCP FOR INDICATION ONLY
T-4	RETURN AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS RETURN AIR DRY BULB TEMPERATURE TO DCP FOR INDICATION ONLY
T-5	MIXED AIR TEMPERATURE SENSOR	SENSES AND TRANSMITS MIXED AIR DRY BULB TEMPERATURE TO DCP FOR CONTROL AND INDICATION
T-6	COOLING COIL LEAVING AIR TEMPERATURE	SENSES AND TRANSMITS COOLING COIL DISCHARGE AIR TEMPERATURE TO DCP FOR INDICATION ONLY
V-1	MODULATING STEAM CONTROL VALVE	PROPORTIONS FLOW OF STEAM TO PREHEAT COIL IN RESPONSE TO DCP
VSMC	VARIABLE SPEED MOTOR CONTROLLER WITH MOTOR STARTER	CONTROLS SUPPLY, RETURN OR EXHAUST FAN MOTOR SPEEDS IN RESPONSE TO DCP
VPS	VELOCITY PRESSURE SENSOR	SENSES AND TRANSMITS VELOCITY PRESSURE TO DCP
T-7	FREEZESTAT	SHUTS DOWN SUPPLY FAN UPON SENSING FREEZE CONDITION

3-AHU1 POINTS LIST

POINT ID	DEVICE TAG	DEVICE DESCRIPTION	POINT TYPE DI	DO	AI	AO
1	DSD-1	RETURN AIR DUCT SMOKE DETECTOR (FIRE SYSTEM SHUTDOWN)	X			
2	T-4	RETURN AIR TEMPERATURE SENSOR				X
3	T-2	OUTSIDE AIR TEMPERATURE SENSOR (GLOBAL POINT)				X
4	T-5	MIXED AIR TEMPERATURE SENSOR ⚠				X
5	T-3	PREHEAT COIL LEAVING AIR TEMPERATURE SENSOR				X
6	T-6	COOLING COIL LEAVING AIR TEMPERATURE SENSOR				X
7	T-1	SUPPLY AIR TEMPERATURE SENSOR				X
8	DSD-2	SUPPLY AIR DUCT SMOKE DETECTOR (FIRE SYSTEM SHUTDOWN)	X			
9	SPS-1	SUPPLY AIR STATIC PRESSURE SENSOR				X
10	C	SUPPLY FAN STATUS CURRENT SWITCH	X			
11	DP-1	FILTER PRESSURE DROP				X
12	C	EXHAUST FAN 3-EF1 STATUS CURRENT SWITCH	X			
13	T-7	FREEZESTAT	X			
14	H-1	RETURN AIR HUMIDITY SENSOR				X
15	OAH	OUTDOOR AIR HUMIDITY (GLOBAL POINT)				X
16	SPS-2	SUPPLY AIR STATIC PRESSURE SENSOR				X
17	VPS-1	SUPPLY AIR FLOW MEASURING STATION				X
18	VPS-2	RETURN AIR FLOW MEASURING STATION				X
19	C	RETURN FAN STATUS CURRENT SWITCH ⚠	X			
20	IAH	INDOOR AIR HUMIDITY				X
A	VSMC	SUPPLY FAN START-STOP		X		
B	VSMC	SUPPLY FAN VARIABLE SPEED MOTOR CONTROLLER				X
C ⚠	D-1	MODULATING OUTSIDE AIR DAMPER				X
D	V-1	MODULATING PREHEAT COIL VALVE				X
E	S	EXHAUST FAN 3-EF1 START-STOP	X			
F	VSMC	RETURN FAN START-STOP	X			
G	VSMC	RETURN FAN VARIABLE SPEED MOTOR CONTROLLER				X
H	D-2	MODULATING RETURN AIR DAMPER				X
I	D-3	MODULATING RELIEF AIR DAMPER				X

NOTE: DDC ZONE CONTROL IS SPECIFIED. PROVIDE ZONE TEMPERATURE SENSOR FOR EACH ZONE.

CVR & VVR CONTROL SEQUENCES W/ OS

1 CONSTANT VOLUME REHEAT TERMINAL CONTROL

1.1 DURING THE OCCUPIED MODE OF OPERATION, WHEN ROOM TEMPERATURE AT T1 IS BELOW SETPOINT, STEAM VALVE V1 ⚠ SHALL MODULATE OPEN TO COIL TO MAINTAIN TEMPERATURE SETPOINT. BOX DAMPER D1 SHALL REMAIN AT CONSTANT MAXIMUM CFM.

1.2 EACH TERMINAL UNIT SHALL INCLUDE AN AIRFLOW SENSOR FOR CALCULATING CFM, AND A DISCHARGE AIR TEMPERATURE SENSOR.

1.3 EXTEND 24 VOLT POWER TO THE TERMINAL BOX CONTROLLER FROM THE ASSOCIATED AIR HANDLING UNIT DDC CONTROL PANEL.

1.4 ROOM SPACE TEMPERATURE SET POINT SHALL BE ADJUSTABLE FROM THE FRONT END COMPUTER INTERFACE.

1.5 OCCUPANCY SENSOR OS1 PROVIDED UNDER DIV. 26 SHALL DETERMINE OCCUPIED/UNOCCUPIED MODES OF OPERATION. EXTEND LOW VOLTAGE WIRING FROM OCCUPANCY SENSOR TO THE TERMINAL BOX CONTROLLER.

1.6 DURING THE UNOCCUPIED MODE OF OPERATION THE CONTROL DAMPER ACTUATOR D1 SHALL POSITION TO THE UNOCCUPIED AIRFLOW SETTING.

1.7 DURING THE UNOCCUPIED MODE OF OPERATION, WHEN THE ROOM TEMPERATURE AT T1 IS BELOW THE UNOCCUPIED HEATING SETPOINT, THE CONTROL SHALL INDEX TO THE OCCUPIED HEATING MODE OF OPERATION. THE CONTROL SHALL REVERT TO UNOCCUPIED OPERATION WHEN ROOM TEMPERATURE T1 RISES ABOVE THE UNOCCUPIED HEATING SETPOINT.

2 VARIABLE VOLUME REHEAT TERMINAL CONTROL

2.1 DURING THE OCCUPIED MODE OF OPERATION, WHEN ROOM TEMPERATURE AT T1 IS BELOW SETPOINT, THE CONTROL DAMPER ACTUATOR, D1 SHALL MODULATE THE DAMPER TO REDUCE AIRFLOW TO THE SUMMER MINIMUM SETTING. ON A FURTHER DROP IN ROOM TEMPERATURE AT T1, THE CONTROL DAMPER SHALL BE MODULATED UPWARD TO THE WINTER MINIMUM AIRFLOW AND THE STEAM VALVE V1 SHALL MODULATE OPEN TO COIL TO MAINTAIN TEMPERATURE SETPOINT. STEAM ⚠

2.2 DURING THE OCCUPIED MODE OF OPERATION, AS ROOM TEMPERATURE RISES ABOVE SETPOINT, STEAM VALVE V1 SHALL CLOSE. IF THE ROOM TEMPERATURE CONTINUES TO RISE ABOVE SETPOINT, DAMPER D1 SHALL MODULATE FROM SUMMER (COOLING) MINIMUM AIRFLOW TO MAXIMUM AIRFLOW TO MAINTAIN ROOM TEMPERATURE. ⚠

2.3 EACH TERMINAL UNIT SHALL INCLUDE AN AIRFLOW SENSOR FOR CALCULATING CFM, AND A DISCHARGE AIR TEMPERATURE SENSOR

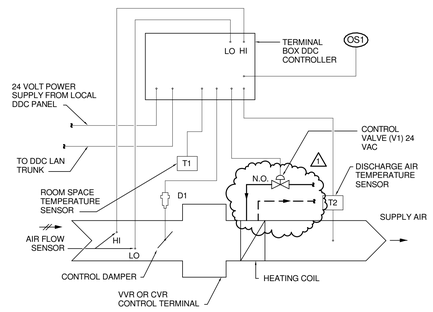
2.4 EXTEND 24 VOLT POWER TO THE TERMINAL BOX CONTROLLER FROM THE ASSOCIATED AIR HANDLING UNIT DDC CONTROL PANEL.

2.5 ROOM SPACE TEMPERATURE SET POINT SHALL BE ADJUSTABLE FROM THE FRONT END COMPUTER INTERFACE.

2.6 OCCUPANCY SENSOR OS1 PROVIDED UNDER DIV. 26 SHALL DETERMINE OCCUPIED/UNOCCUPIED MODES OF OPERATION. EXTEND LOW VOLTAGE WIRING FROM OCCUPANCY SENSOR TO THE TERMINAL BOX CONTROLLER.

2.7 DURING THE UNOCCUPIED MODE OF OPERATION THE CONTROL DAMPER ACTUATOR D1 SHALL POSITION TO THE UNOCCUPIED AIRFLOW SETTING.

2.8 DURING THE UNOCCUPIED MODE OF OPERATION, WHEN THE ROOM TEMPERATURE AT T1 IS BELOW THE UNOCCUPIED HEATING SETPOINT, THE CONTROL SHALL INDEX TO THE OCCUPIED HEATING MODE OF OPERATION. THE CONTROL SHALL REVERT TO UNOCCUPIED OPERATION WHEN ROOM TEMPERATURE T1 RISES ABOVE THE UNOCCUPIED HEATING SETPOINT.



VVR AND CVR TERMINAL CONTROLS

SEQUENCE OF OPERATION FOR 3-AHU1

1. GENERAL

1.1 UNIT IS NORMALLY STARTED AND STOPPED BY THE DCP OR REMOTELY AT THE ECC. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE.

1.2 WHEN THE UNIT IS "OFF", FOR ANY REASON, OUTSIDE AIR DAMPER D-1 AND RELIEF AIR DAMPER D-3 SHALL BE FULLY CLOSED, RETURN AIR DAMPER D-2 SHALL BE FULLY OPEN, AND SUPPLY AND RETURN FANS SHALL BE OFF.

1.3 WHEN THE UNIT IS "ON", SUPPLY AND RETURN FANS SHALL START, AND D-1, D-2, AND D-3 SHALL MODULATE IN ACCORDANCE WITH THE FOLLOWING SEQUENCE:

2. TEMPERATURE CONTROL

2.1 SUPPLY AIR TEMPERATURE, SENSED BY T-1, SHALL BE MAINTAINED AT SETPOINT OF 55 DEG. F. VIA DCP BY ENERGIZING THE DX COOLING SYSTEM OR MODULATING ECONOMIZER DAMPERS D-1, D-2 AND D-3 OR MODULATING PREHEAT COIL VALVE V-1, IN SEQUENCE. SEPARATE CONTROL LOOPS SHALL BE UTILIZED FOR DX COOLING, ECONOMIZER COOLING AND HEATING FUNCTION.

2.2 DX COOLING COIL - WHEN THE SUPPLY AIR TEMPERATURE, AS SENSED BY T-1, RISES ABOVE SETPOINT AND THE ECONOMIZER IS DISABLED, THE SOLENOID VALVES AND COMPRESSOR STEPPING SHALL BE ENERGIZED IN SEQUENCE TO SATISFY THE DISCHARGE AIR TEMPERATURE SETPOINT. PROVIDE ON AND OFF TIME DELAYS BETWEEN STEPS. INTERLOCK COOLING CONTROL WITH SUPPLY FAN STATUS CURRENT SWITCH, TO KEEP MECHANICAL COOLING OFF UNLESS THE FAN IS OPERATING.

WHEN THE SUPPLY AIR TEMPERATURE SETPOINT IS SATISFIED AS DETECTED BY T-1, AND RETURN AIR HUMIDITY LEVEL IS ABOVE SETPOINT OF 50% AS DETECTED BY H-1, THE SOLENOID VALVES AND COMPRESSOR STEPPING SHALL BE ENERGIZED IN SEQUENCE TO COOL AND DEHUMIDIFY THE SUPPLY AIR.

3. ENTHALPY ECONOMIZER CONTROL

3.1 OUTSIDE AIR TEMPERATURE AND HUMIDITY, AND RETURN AIR TEMPERATURE AND HUMIDITY SHALL BE MEASURED, AND THE ENTHALPY OF EACH DETERMINED. IF THE ENTHALPY OF THE OUTSIDE AIR IS LESS THAN THE ENTHALPY OF THE RETURN AIR, THE ECONOMIZER SHALL BE ENABLED. WHEN THE OUTSIDE AIR ENTHALPY IS HIGHER THAN THE RETURN AIR ENTHALPY AND MECHANICAL COOLING IS AVAILABLE, THE ECONOMIZER SHALL BE DISABLED.

4. ECONOMIZER CYCLE

4.1 WHEN THE UNIT OPERATES IN THE OCCUPIED MODE, THE MINIMUM OUTSIDE AIR SHALL BE PROVIDED BY OPENING AND MODULATING MINIMUM OUTSIDE AIR DAMPERS D-1 IN RESPONSE TO AIR FLOW CONTROL, DESCRIBED IN PARAGRAPH 5.2 TO SUPPLY MINIMUM OUTSIDE AIR. THE RETURN AIR DAMPERS D-2 SHALL OPEN FULLY, AND RELIEF AIR DAMPERS D-3 SHALL REMAIN CLOSED. THIS CONDITION IS THE NORMAL POSITION AND SHALL BE MAINTAINED DURING THE OCCUPIED MODE EXCEPT DURING THE "ECONOMIZER" CYCLE. DURING THE "ECONOMIZER" CYCLE, THE AMOUNT OF OUTSIDE AIR AND RELIEF AIR SHALL BE INCREASED AS REQUIRED TO MAINTAIN THE UNIT DISCHARGE AIR TEMPERATURE SETPOINT. PROVIDE A MIXED AIR SENSOR AND LOW LIMIT CONTROL SET AT 50 DEGREES F. TO PREVENT OVER-OPENING OF THE ECONOMIZER OUTSIDE AIR DAMPERS. ALL CONTROL SETPOINTS SHALL BE FULLY ADJUSTABLE TO MEET JOB CONDITIONS. ⚠

5. AIR FLOW CONTROL

5.1 THE SUPPLY AIR FLOW SHALL BE CONTROLLED BY THE DCP MODULATING THE SUPPLY FAN VARIABLE SPEED MOTOR CONTROLLER (VSMC) TO MAINTIAN 1" OF DUCT STATIC PRESSURE (FIELD ADJUSTABLE), SENSED BY SPS-1 AND SPS-2, LOCATED 2/3 DISTANCE DOWN THE SUPPLY DUCTS.

5.2 THE DCP, USING TOTAL SUPPLY AIR AND RETURN AIR FLOW SIGNALS (VPS-1 AND VPS-2), SHALL RESET THE RETURN AIR FAN VARIABLE SPEED MOTOR CONTROLLER (VSMC) USING RETURN AIR FLOW SIGNAL (VPS-2) TO MAINTAIN A CONSTANT AIR FLOW DIFFERENCE BETWEEN THE SUPPLY AIR AND THE RETURN AIR EQUAL TO MINIMUM OUTSIDE AIR.

5.3 VARIABLE SPEED MOTOR CONTROLLERS SHALL RESPOND TO START/STOP COMMANDS AND ALL SAFETIES (FREEZE, SMOKE, ETC.) WHETHER IN THE HAND, AUTOMATIC OR BYPASS MODES. ⚠

6. FREEZE PROTECTION

6.1 IF THE PREHEAT COIL DISCHARGE AIR TEMPERATURE AS SENSED BY T-3 FALLS BELOW 45 DEG.F, AN ALARM SIGNAL SHALL INDICATE AT THE DCP AND ECC. IF THE PREHEAT COIL DISCHARGE AIR TEMPERATURE FALLS BELOW 40 DEG.F AS SENSED BY FREEZESTAT T-7, THE SUPPLY AND RETURN FANS SHALL SHUT DOWN AND A CRITICAL ALARM SHALL INDICATE AT THE DCP AND ECC. T-7 SHALL BE HARDWIRED TO THE SUPPLY FAN VSMC TO SHUT DOWN THE UNIT IN THE HAND, AUTO OR BYPASS MODES. T-7 SHALL REQUIRE MANUAL RESET AT THE DEVICE.

7. AUTOMATIC SHUTDOWN / RESTART

7.1 WHEN SMOKE IS DETECTED BY RETURN DUCT SMOKE DETECTOR, DSD-1, OR SUPPLY DUCT SMOKE DETECTOR, DSD-2, THE SUPPLY AND RETURN AIR FANS AND INTERLOCKED EXHAUST FAN SHALL SHUT "OFF", A SUPERVISORY SIGNAL SHALL BE TRANSMITTED TO THE FIRE ALARM SYSTEM, AND A SUPERVISORY SIGNAL SHALL INDICATE AT THE DCP AND ECC. SUPPLY AND RETURN FANS AND INTERLOCKED EXHAUST FAN SHALL RESTART WHEN THE FIRE ALARM CIRCUIT IS RESET.

8. DISCHARGE AIR RESET

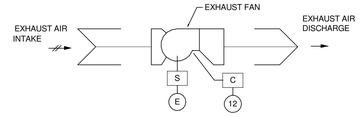
8.1 THE AIR HANDLING UNIT CONTROLS SHALL PROVIDE DISCHARGE AIR TEMPERATURE CONTROL BASED ON ZONE DEMAND DEVIATION FROM SETPOINT. ALL ZONES SHALL BE SAMPLED AND THE ZONE FURTHEST FROM SETPOINT SHALL GOVERN. AS THE DEVIATION FROM SETPOINT DECREASES, THE DISCHARGE AIR SHALL BE RESET, 55 DEG. F AND 62 DEG. F SHALL BE THE LOW AND HIGH RESET LIMITS, RESPECTIVELY. ALL CONTROL SETPOINTS (INCLUDING HIGH AND LOW SET POINTS FOR DISCHARGE AIR TEMPERATURE) SHALL BE FULLY ADJUSTABLE TO MEET JOB CONDITIONS.

9. EMERGENCY CONSTANT SPEED OPERATION

9.1 UPON FAILURE OF THE VSMC, THE SUPPLY AND RETURN FANS SHALL BE STARTED/STOPPED MANUALLY AT THE DCP OR THE ECC THROUGH THE BY-PASS STARTER. FANS SHALL THEN BE OPERATED AT CONSTANT SPEED.

10. MORNING WARM-UP AND INITIAL START

10.1 AIR HANDLING SYSTEM SHALL ENTER A MORNING WARM-UP MODE IN ADVANCE OF THE OCCUPIED TIME VIA AN OPTIMAL START SEQUENCE, THE OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL REMAIN COMPLETELY CLOSED AND THE RETURN DAMPERS SHALL REMAIN FULLY OPEN. EXHAUST FAN 3-EF1 SHALL REMAIN OFF. THIS MODE SHALL CONTINUE UNTIL THE RETURN TEMPERATURE RISES ABOVE 70 DEGREES F., AT WHICH TIME THE ABOVE CONTROL SEQUENCES AND EXHAUST FAN 3-EF1 SHALL BE ENABLED. ECONOMIZER CONTROL SHALL BE DELAYED TWO MINUTES DURING START-UP TO PREVENT CABINET HEAT FROM FALSE LOADING THE SYSTEM.



GENERAL EXHAUST FAN 3-EF1

GENERAL EXHAUST FAN 3-EF1 SHALL BE A SEPARATE START-STOP POINT OF THE DIGITAL CONTROL SYSTEM. 3-EF1 SHALL BE SOFTWARE INTERLOCKED TO OPERATE WITH AIR HANDLING UNIT 3-AHU1. ALL FANS SHALL INCLUDE FAN STATUS.

* REFER TO POINTS LIST ON THIS SHEET FOR CONTROL POINTS AND DESCRIPTIONS ASSOCIATED WITH GENERAL EXHAUST FANS.

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Revisions		Date
1	ADDENDUM 2	3/14/13

CONSULTANTS:

Heapy Engineering
Mechanical Electrical Commissioning Technology
Nationally Recognized Leader in Sustainability / LEED
1400 W Dorothy Lane, Dayton OH 45409-1310
Ph: 937-224-0861 Fax: 937-224-5777 www.heapy.com
Heapy Project No. 2011-04033 Firm License No. 01528

STATE OF OHIO — JOHN A. BLACK 49341 — REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

JOHN POE ARCHITECTS
116 EAST THIRD STREET
DAYTON, OHIO 45402-2130
937 461 3290 PHONE
937 461 0260 FAX
jpa@johnpoe.com

Drawing Title: CONTROLS AND AUTOMATION

Approved: Project Director

Project Title: Renovate Occupational Therapy Building 3

Location: Chillicothe, Ohio

Date: 02/04/2013 | Checked: DLE | Drawn: WJS

Project No. VA Project No. 538-13-101 JPA Project No. 11013.00

Building Number: 3

Drawing Number: H6

Dwg. of XX

Office of Construction and Facilities Management
Department of Veterans Affairs

GENERAL NOTES

A REFER TO SHEET H1 FOR INDEX, LEGEND, AND GENERAL NOTES.

NOTES

1 EXISTING AIR HANDLING UNIT TO REMAIN.

2 EXISTING DUCTWORK TO REMAIN.

3 EXISTING FAN COIL UNIT TO REMAIN.

4 EXISTING EXHAUST FAN TO REMAIN.

5 EXISTING CONDENSING UNIT TO REMAIN.

6 EXISTING RADIATOR TO REMAIN.

7 EXISTING UNIT HEATER TO REMAIN.

8 EXISTING THERMOSTAT TO REMAIN.

9 EXISTING AIR DEVICE TO REMAIN.

10 REMOVE EXISTING AIR HANDLING UNIT AND ASSOCIATED DUCTWORK, PIPING, CONTROLS, ETC.

11 REMOVE EXISTING UNIT HEATER AND ASSOCIATED PIPING, CONTROLS, ETC.

12 REMOVE EXISTING EXHAUST FAN AND ASSOCIATED CONTROLS, ETC.

13 REMOVE EXISTING THERMOSTAT AND ASSOCIATED WIRING/TUBING, ETC.

14 REMOVE EXISTING CONDENSING UNIT AND ASSOCIATED PIPING, CONTROLS, BASE SUPPORT, ETC.

15 REMOVE EXISTING AIR DEVICE AND ASSOCIATED DUCTWORK, SUPPORTS, ETC.

16 REMOVE EXISTING DUCTWORK AND ASSOCIATED DAMPERS, SUPPORTS, ETC.

17 REMOVE EXISTING PIPING BACK TO FLOOR FOR RECONNECTION IN NEW WORK.

18 REMOVE EXISTING PIPING AND ASSOCIATED VALVES, SUPPORTS, ETC.

19 REMOVE EXISTING RADIATOR AND ASSOCIATED PIPING, ETC. REMOVE PIPING BACK TO FLOOR FOR RECONNECTION IN NEW WORK.

20 REMOVE EXISTING SINGLE HOOD WELDING EXHAUST SYSTEM. PATCH ROOF TO MATCH EXISTING.

21 REMOVE EXISTING PAINT BOOTH AND ASSOCIATED EXHAUST FAN, DUCTWORK, CONTROLS, ETC.

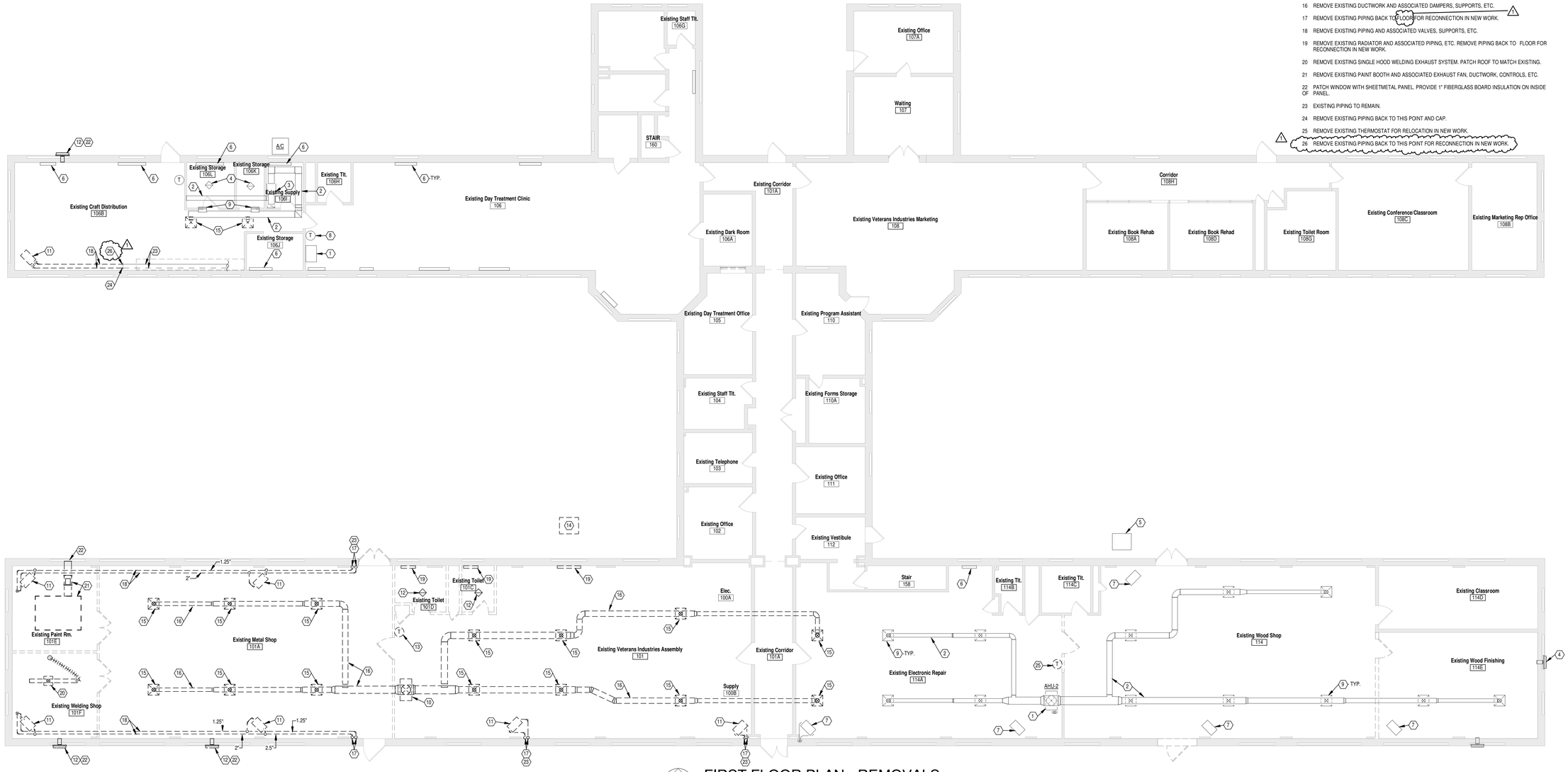
22 PATCH WINDOW WITH SHEETMETAL PANEL. PROVIDE 1" FIBERGLASS BOARD INSULATION ON INSIDE OF PANEL.

23 EXISTING PIPING TO REMAIN.

24 REMOVE EXISTING PIPING BACK TO THIS POINT AND CAP.

25 REMOVE EXISTING THERMOSTAT FOR RELOCATION IN NEW WORK.

26 REMOVE EXISTING PIPING BACK TO THIS POINT FOR RECONNECTION IN NEW WORK.



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FIRST FLOOR PLAN - REMOVALS

Scale: 1/8" = 1'-0"

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1	ADDENDUM 2	3/14/13
Revisions		*Date*

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Mechanical Electrical Commissioning Technology
Nationally Recognized Leader in Sustainability / LEED
1400 W Dorothy Lane, Dayton OH 45409-1310
Ph: 937-224-0861 Fax: 937-224-5777 www.heapy.com
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STATE OF OHIO · JOHN A. BLACK 49341 · REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

JOHN POE ARCHITECTS
116 EAST THIRD STREET
DAYTON, OHIO 45402-2130
937 461 3290 PHONE
937 461 0260 FAX
joa@johnpoe.com

Drawing Title: FIRST FLOOR PLAN - REMOVALS

Approved: Project Director

Project Title: Renovate Occupational Therapy Building 3

Location: Chillicothe, Ohio

Date: 02/04/2013 | Checked: DLE | Drawn: WJS

Project No. VA Project No. 538-13-101 JPA Project No. 11013.00

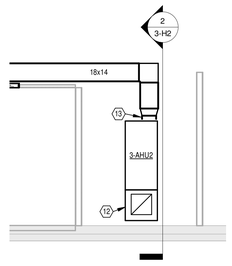
Building Number: 3

Drawing Number: 3-H1

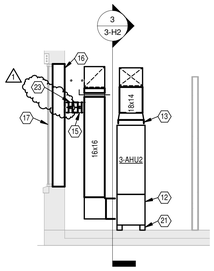
Dwg. of xx

Office of Construction and Facilities Management

Department of Veterans Affairs



3 **3-AHU2 NORTH SECTION**
SCALE: 1/4" = 1'-0"



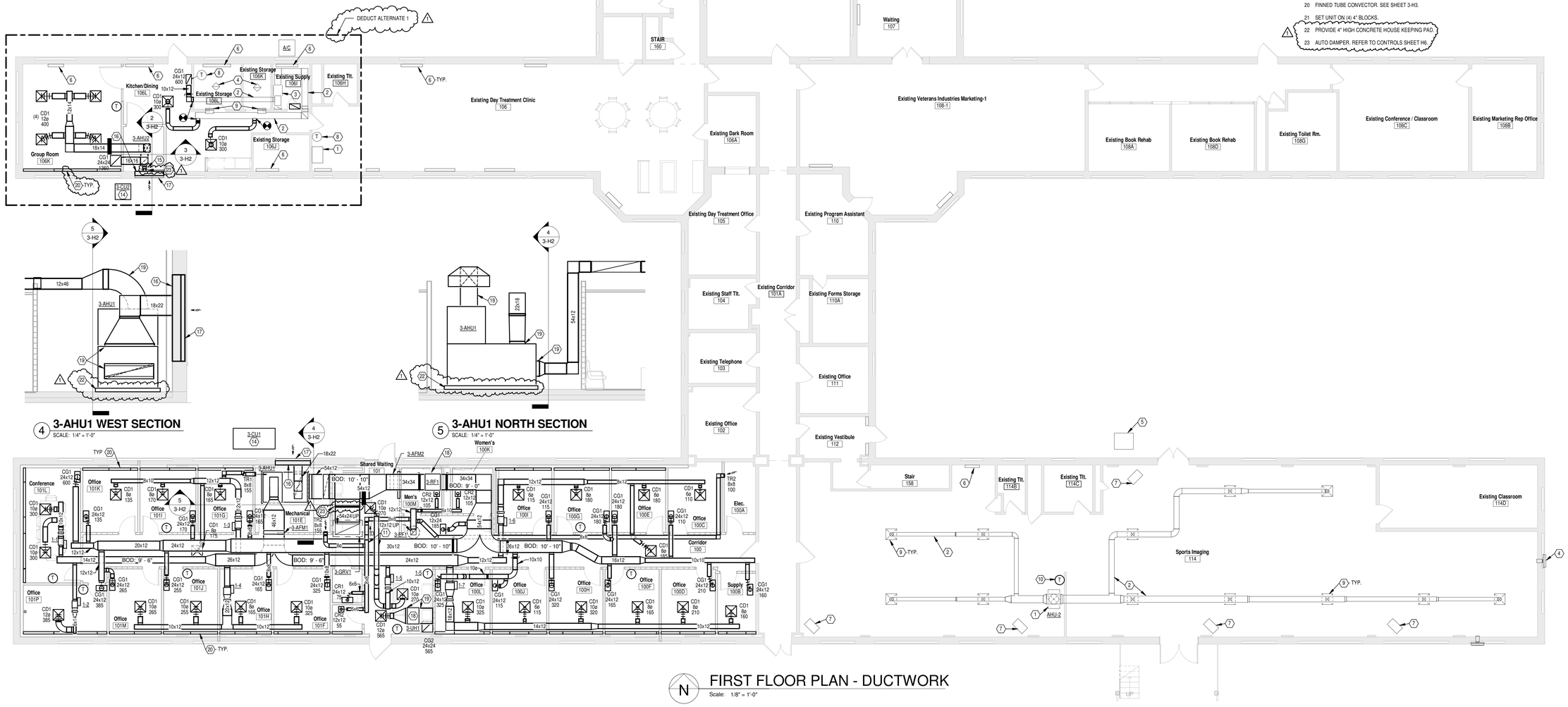
2 **3-AHU2 WEST SECTION**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

A REFER TO SHEET H1 FOR INDEX, LEGEND, AND GENERAL NOTES.

NOTES

1 EXISTING AIR HANDLING UNIT TO REMAIN.
2 EXISTING DUCTWORK TO REMAIN.
3 EXISTING FAN COIL UNIT TO REMAIN.
4 EXISTING EXHAUST FAN TO REMAIN.
5 EXISTING CONDENSING UNIT TO REMAIN.
6 EXISTING RADIATOR TO REMAIN.
7 EXISTING UNIT HEATER TO REMAIN.
8 EXISTING THERMOSTAT TO REMAIN.
9 EXISTING AIR DEVICE TO REMAIN.
10 RELOCATE THERMOSTAT TO THIS LOCATION.
11 RUN DUCT IN JOIST SPACE.
12 PROVIDE PLENUM BOX FULL SIZE OF UNIT INLET CAPABLE OF SUPPORTING UNIT.
13 TRANSITION DUCT TO FULL SIZE OF UNIT OUTLET.
14 MOUNT UNIT TO BASE PAD. COORDINATE EXACT LOCATION OF UNIT WITH COTR.
15 BALANCE TO 240 CFM.
16 PROVIDE 2" DOUBLE WALL INSULATED SHEETMETAL PLENUM BOX FULL SIZE OF LOUVER.
17 NEW LOUVER FULL SIZE OF WINDOW OPENING. APPROXIMATE SIZE: 64"W x 96" H. FIELD VERIFY.
18 SUSPEND UNIT FROM STRUCTURE WITH VIBRATION ISOLATORS. PROVIDE FLEXIBLE DUCT CONNECTORS AT UNIT INLET AND OUTLET.
19 DUCT FULL SIZE OF UNIT CONNECTION.
20 FINNED TUBE CONVECTOR. SEE SHEET 3-H3.
21 SET UNIT ON (4) 4" BLOCKS.
22 PROVIDE 4" HIGH CONCRETE HOUSE KEEPING PAD.
23 AUTO DAMPER. REFER TO CONTROLS SHEET H6.



N **FIRST FLOOR PLAN - DUCTWORK**
Scale: 1/8" = 1'-0"

4 **3-AHU1 WEST SECTION**
SCALE: 1/4" = 1'-0"

5 **3-AHU1 NORTH SECTION**
SCALE: 1/4" = 1'-0"

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1400 W Dorothy Lane, Dayton OH 45409-1310
Ph: 937-224-0861 Fax: 937-224-5777 www.heapy.com
Heapy Project No. 2011-04033 Firm License No. 01528

STATE OF OHIO · JOHN A. BLACK · 49341 · REGISTERED PROFESSIONAL ENGINEER

ARCHITECT/ENGINEERS:

JOHN POE ARCHITECTS
116 EAST THIRD STREET
DAYTON, OHIO 45402-2130
937 461 3290 PHONE
937 461 0260 FAX
jpa@johnpoe.com

Drawing Title: FIRST FLOOR PLAN - DUCTWORK

Approved: Project Director

Project Title: Renovate Occupational Therapy Building 3

Location: Chillicothe, Ohio

Project No. VA Project No. 538-13-101 JPA Project No. 11013.00

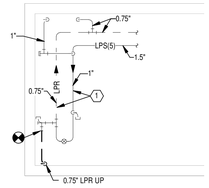
Building Number: 3

Drawing Number: 3-H2

Date: 02/04/2013 Checked: DLE Drawn: WJS

Dwg. of xx

Office of Construction and Facilities Management
Department of Veterans Affairs



2 BASEMENT FLOOR PLAN - PIPING

SCALE: 1/8" = 1'-0"

GENERAL NOTES

A REFER TO SHEET H1 FOR INDEX, LEGEND, AND GENERAL NOTES.

NOTES

1 EXISTING PIPING TO REMAIN.

2 PROVIDE REFRIGERANT PIPING AND ACCESSORIES PER MANUFACTURERS RECOMMENDATIONS. LINE REPRESENTS SUGGESTED ROUTE. BOTH PIPES SHALL BE INSULATED.

3 SEAL WALL PENETRATION LIQUID TIGHT.

4 PROVIDE CONVECTOR CABINET FROM WALL TO WALL.

5 ROUTE CONDENSATE PIPING LOW IN NEW FURRED WALL.

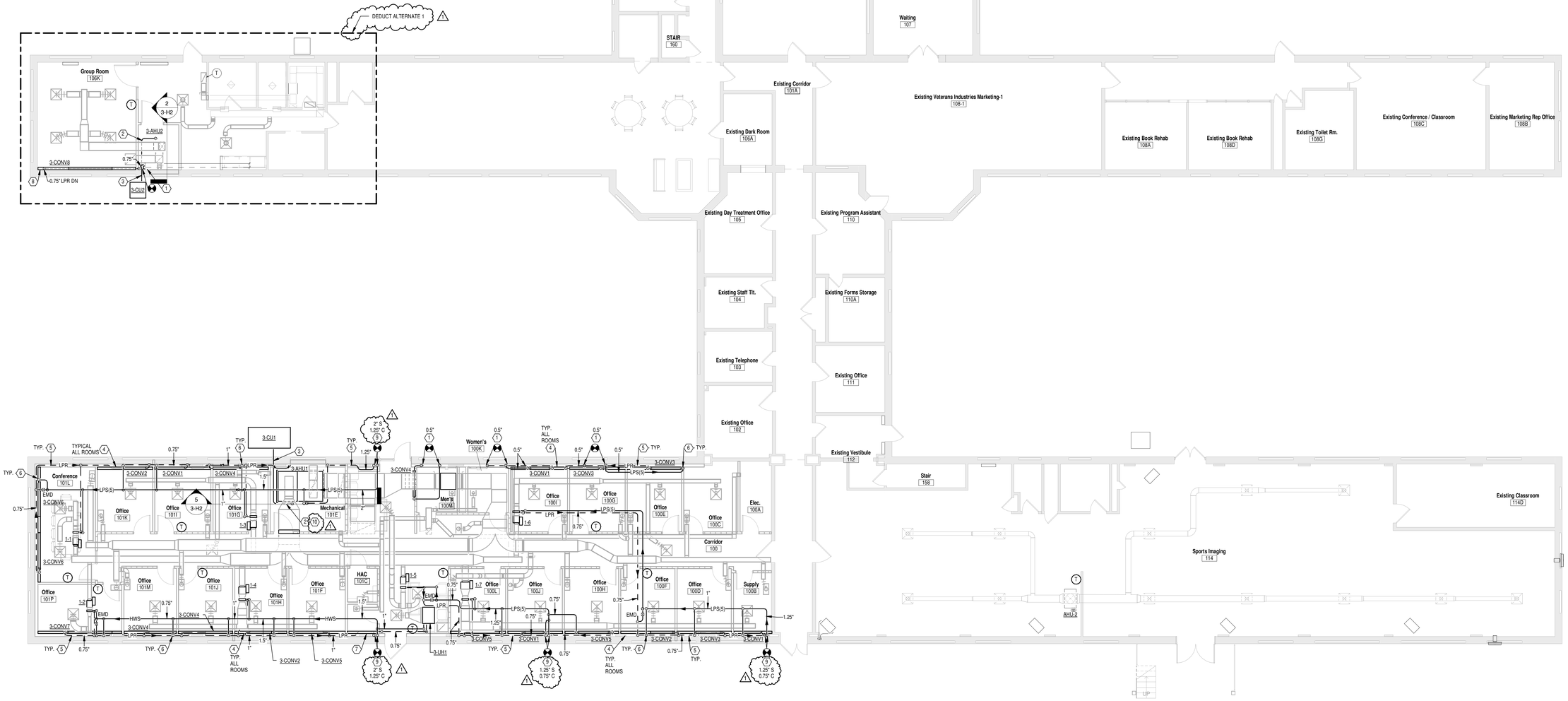
6 EXTEND STEAM PIPING DOWN IN NEW FURRED WALL TO FINNED TUBE CONVECTOR.

7 PROVIDE CONVECTOR CABINET TO CONCEAL PIPING AROUND COLUMN.

8 EXTEND 0.75" LPR DOWN. REFER TO BASEMENT FLOOR PLAN ON THIS SHEET FOR CONTINUATION.

1 9 CONNECT TO EXISTING PIPING NEAR FLOOR.

10 PROVIDE PROJECT SPECIFIC REFRIGERANT PIPING DIAGRAM DURING SHOW DRAWING PHASE. DIAGRAM TO INCLUDE PIPING LAYOUT, SIZES AND DEVICES.



1 FIRST FLOOR PLAN - PIPING

SCALE: 1/8" = 1'-0"

FULLY SPRINKLERED

1	ADDENDUM 2	3/14/13
Revisions		Date

CONSULTANTS:

Heapy Engineering
Mechanical Electrical Commissioning Technology
Nationally Recognized Leader in Sustainability / LEED
1400 W Dorothy Lane, Dayton OH 45409-1310
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